Corn Dust 2015

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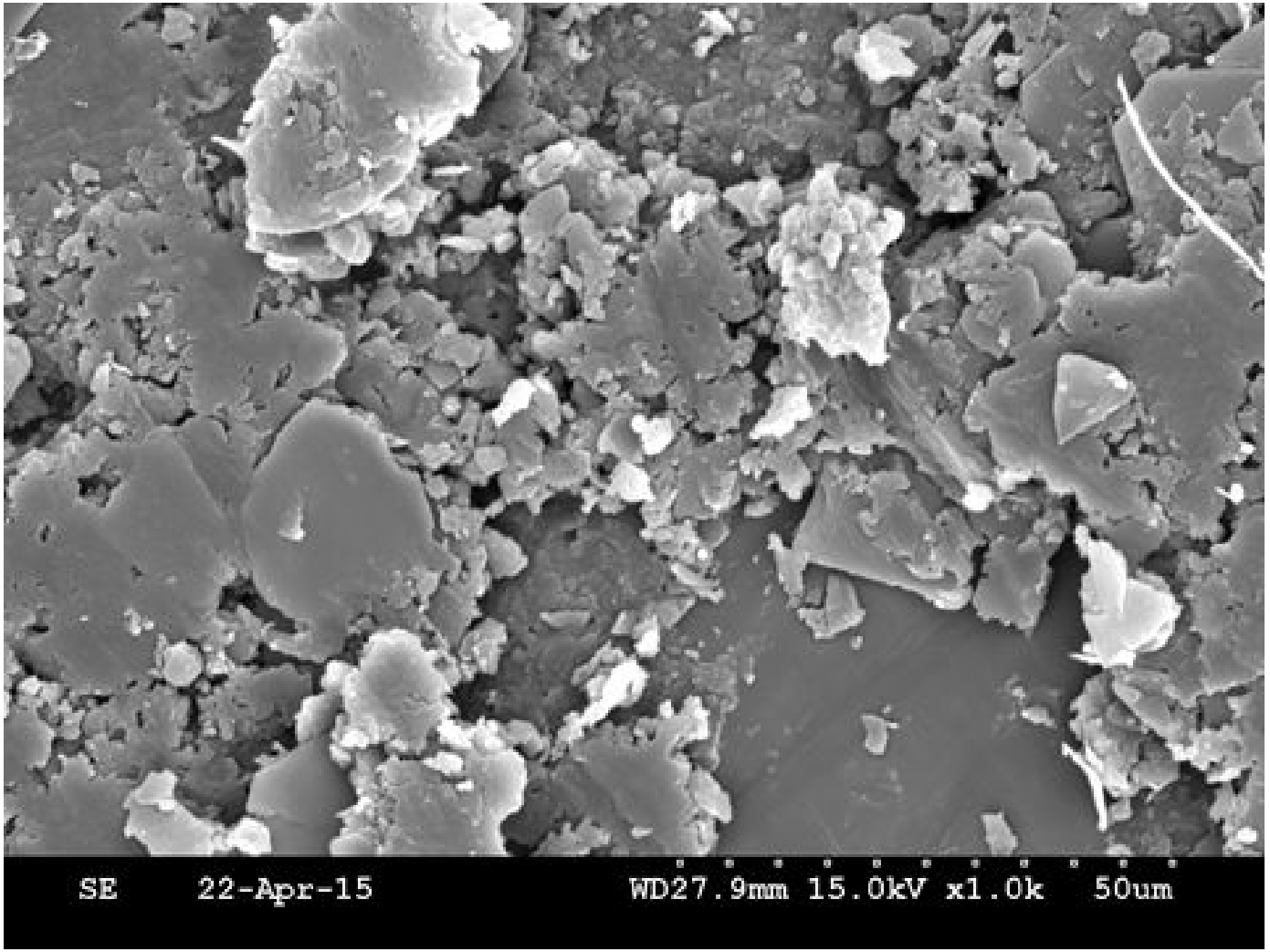
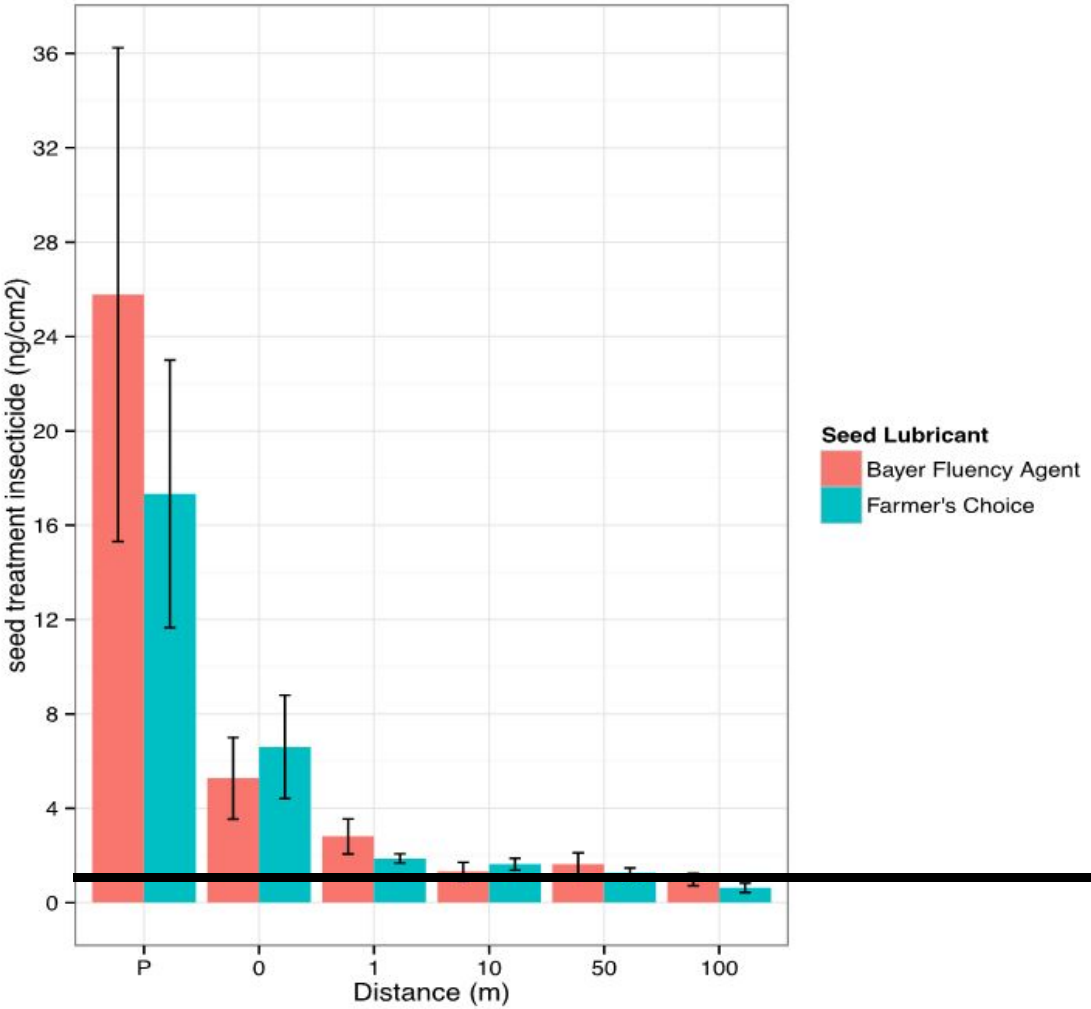
A
B


SE 22-Apr-15
WD27.9mm 15.0kV x1.0k 50um

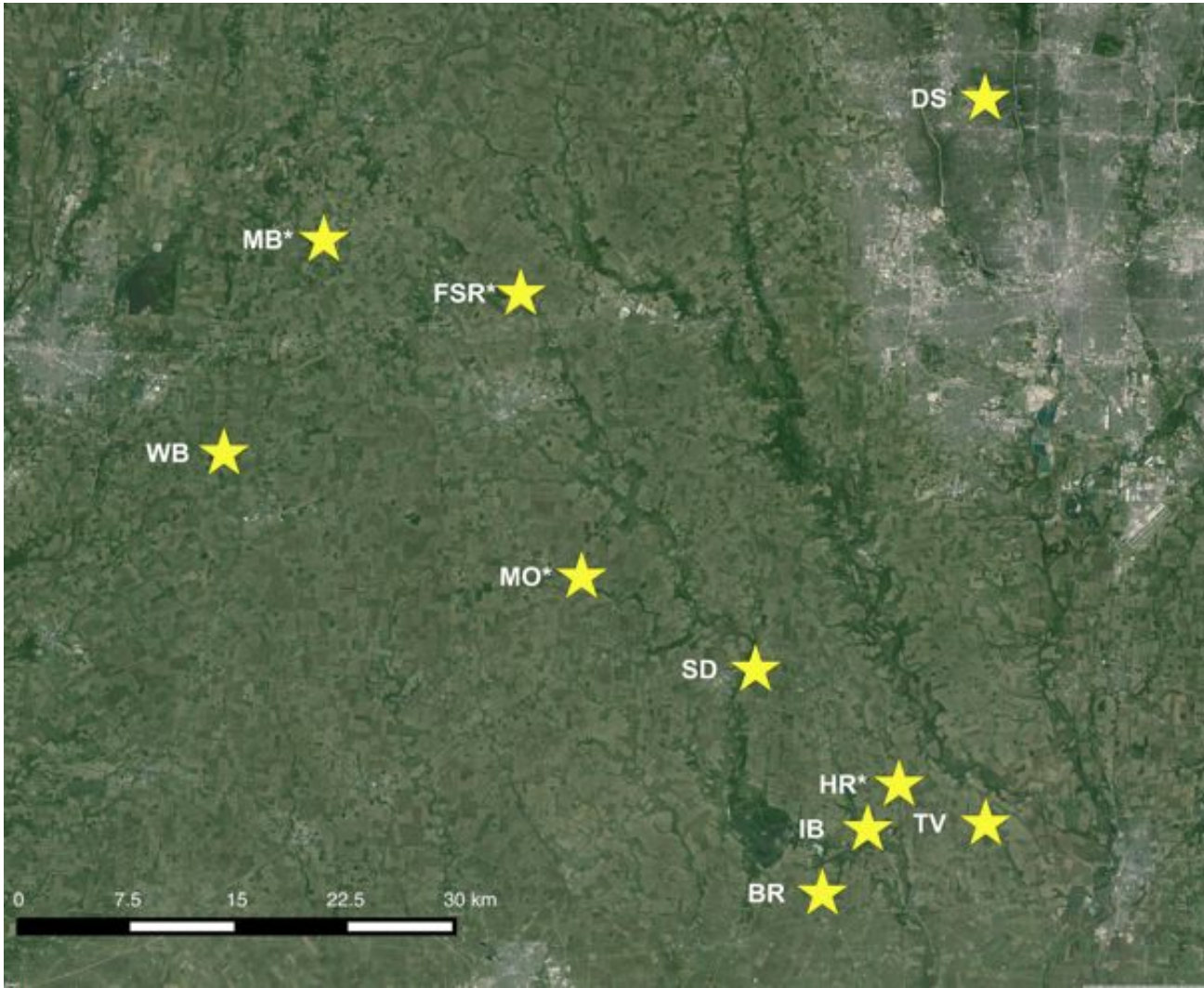


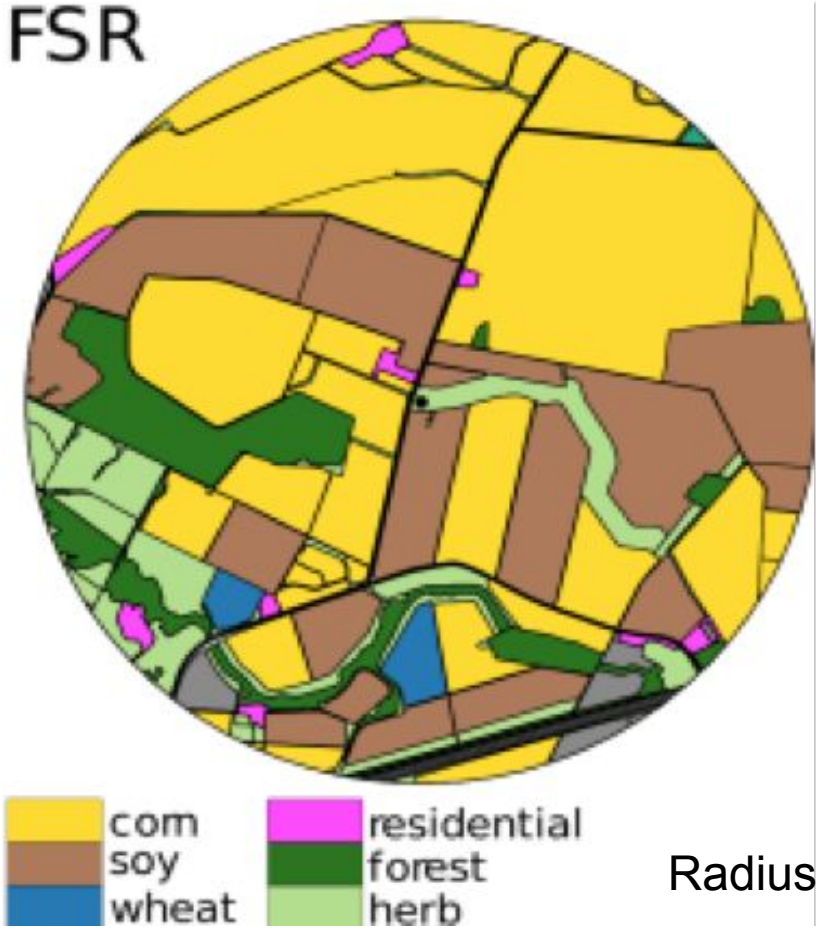
Tier I
Level of Concern (LOC) for foliar application of clothianidin =

0.7 ng /cm^2

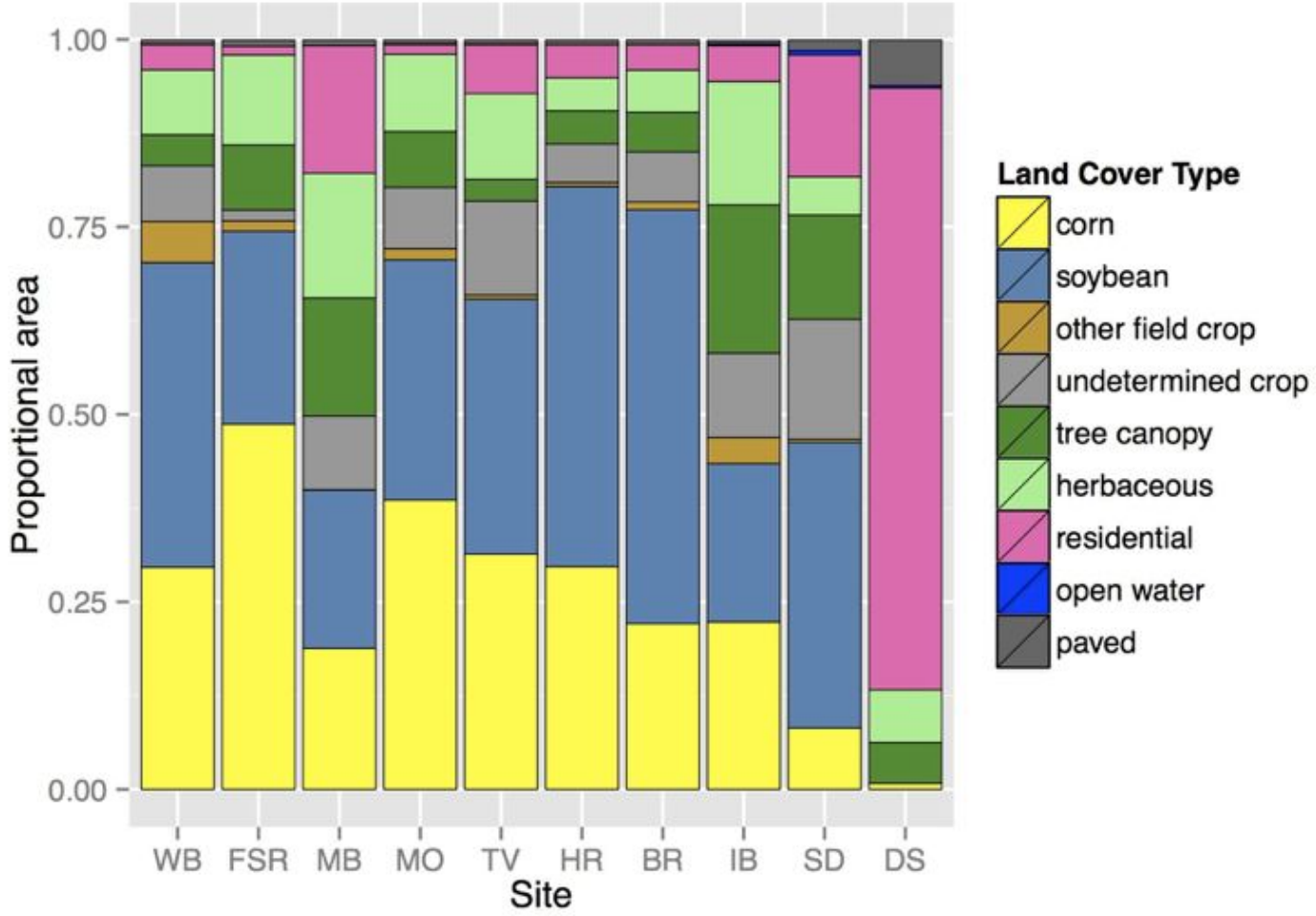
Field Experiments

Study sites





Radius = 2 km


1.00
0.75
0.50
0.25
0.00
Proportional area
WB
FSR
MB
MO
TV
HR
BR
IB
SD
DS
Site
Land Cover Type
corn
soybean
other field crop
undetermined crop
tree canopy
herbaceous
residential
open water
paved

Apiary setup:

Tracked 2 - 6 actively foraging, queen-right colonies per site

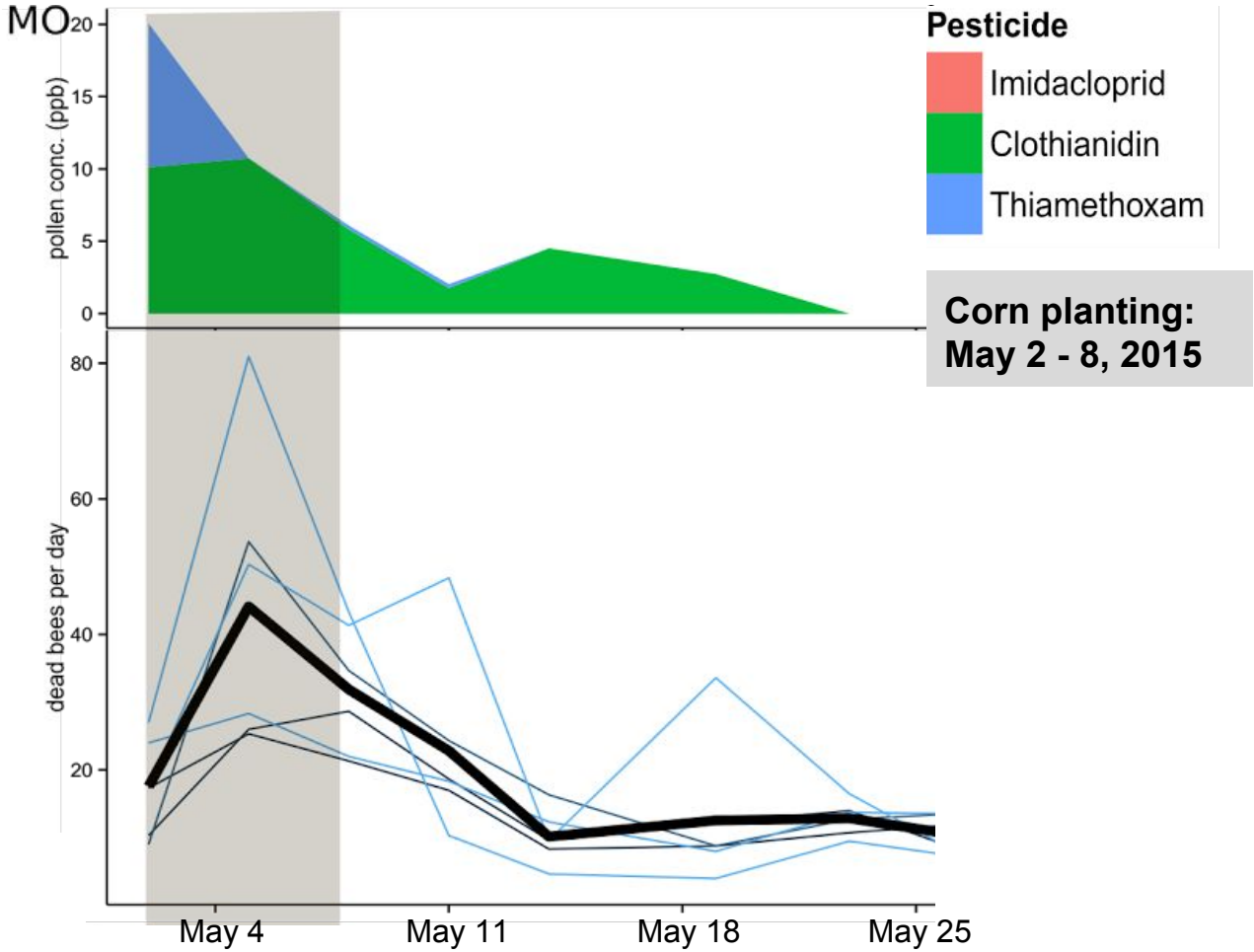
Monitored hive conditions: queen status, colony growth, honey, pollen, and mite loads

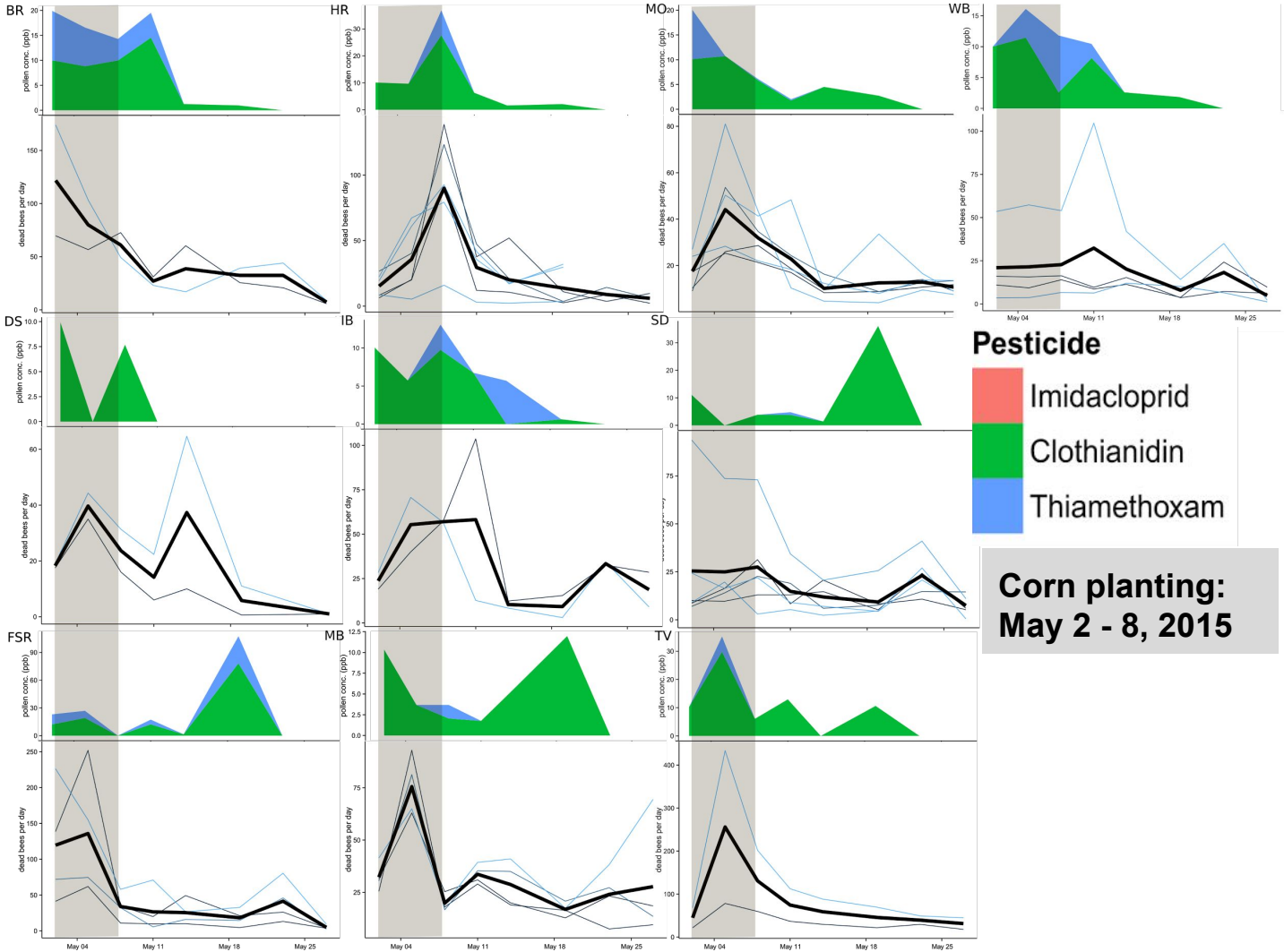
Pollen traps were installed on 2 - 4 additional hives for pollen sampling

Pollen trap “ON”

Pollen trap “OFF”


Use “Drop Zone Dead Bee
Traps” to collect dead bees


MO
pollen conc. (ppb)
20
15
10
5
0
Pesticide
Imidacloprid
Clothianidin
Thiamethoxam
Corn planting:
May 2 - 8, 2015
dead bees per day
80
60
40
20
May 4
May 11
May 18
May 25


BR
HR
MO
WB
DS
IB
SD
FSR
MB
TV
pollen conc. (ppb)
dead bees per day
May 04
May 11
May 18
May 25
Pesticide
Imidacloprid
Clothianidin
Thiamethoxam
Corn planting:
May 2 - 8, 2015

Hive monitoring and maintenance

Detailed inspections
- pre-planting (April 27-30)
- post-planting I (May 20-22)
- post-planting II (June 19 - 24)
- post-planting III (August 14 - 22)

Honey harvest:
- June/September

Mite treatment:
- Apivar: before experiment
- Formic acid: June, September
- Oxalic acid: November - December

Feeding (as needed):
- November - February

Quantifying hive parameters

“Box crack” inspections:
- seams of bees
- mite count (sugar shake)

Frame area inspections:
- bees
- capped brood
- open brood
- honey
- pollen
- empty drawn comb
- undrawn foundation
- drone brood
- queen cells

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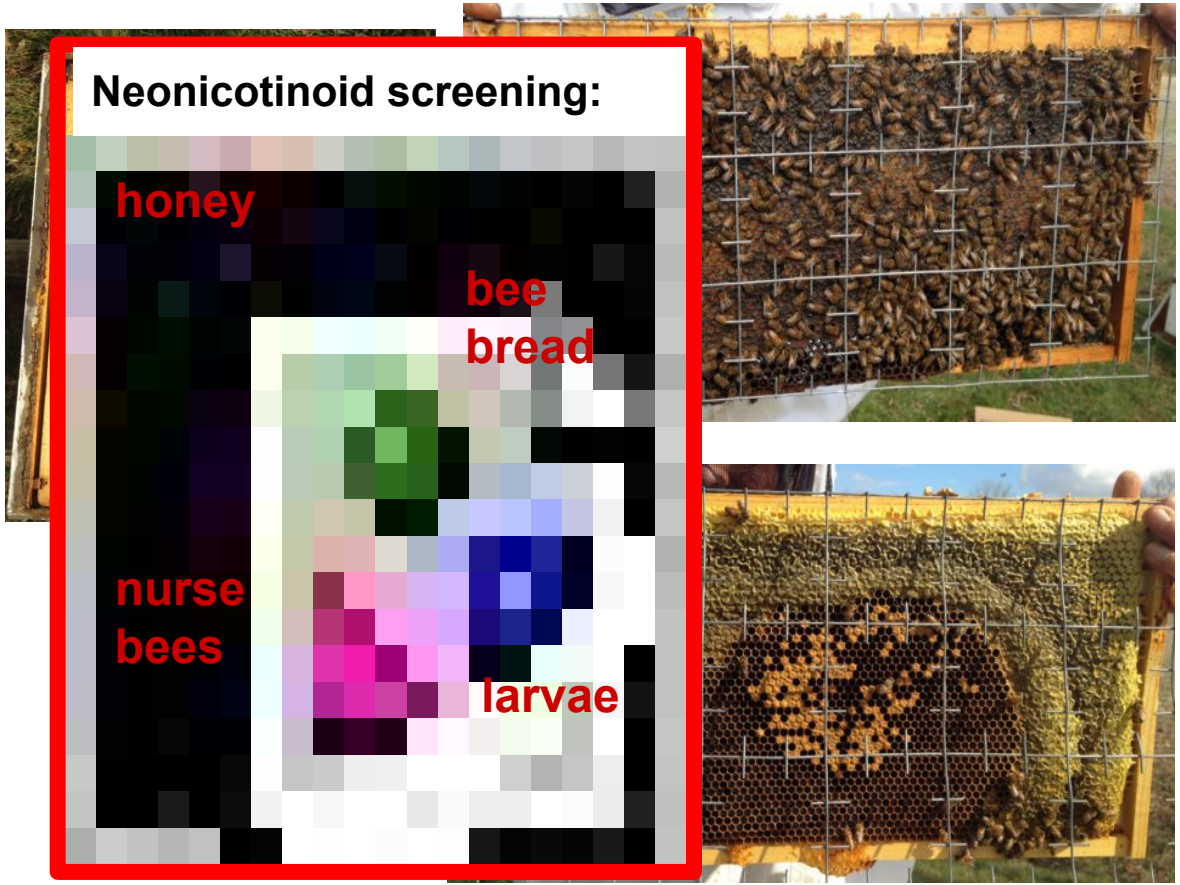
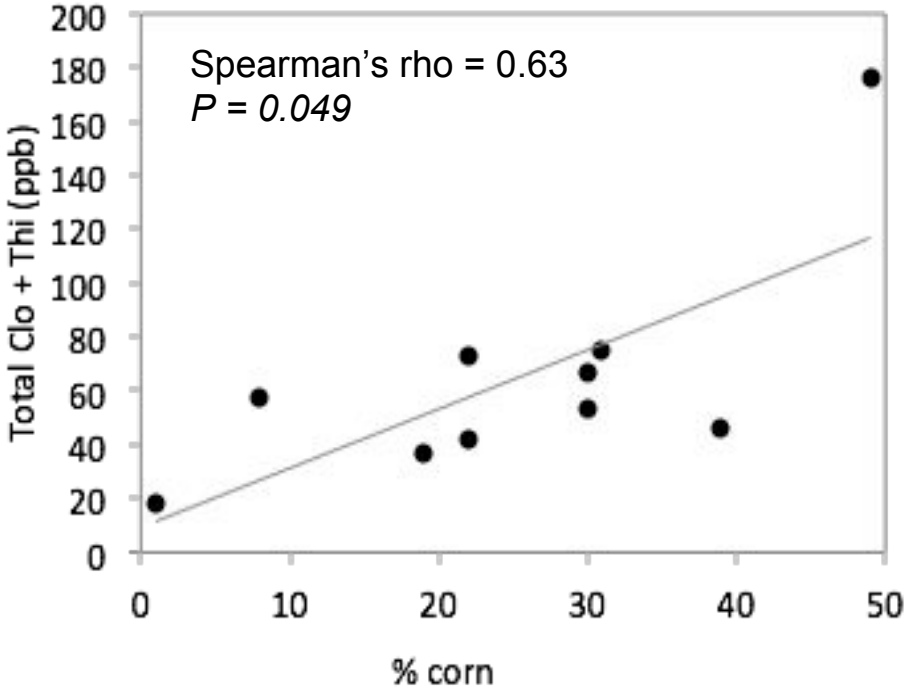
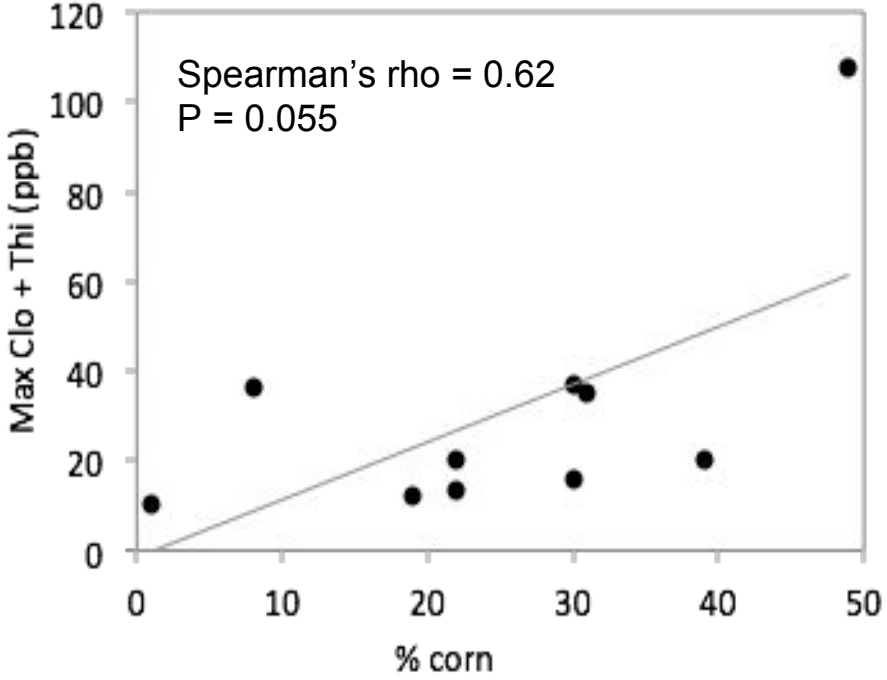


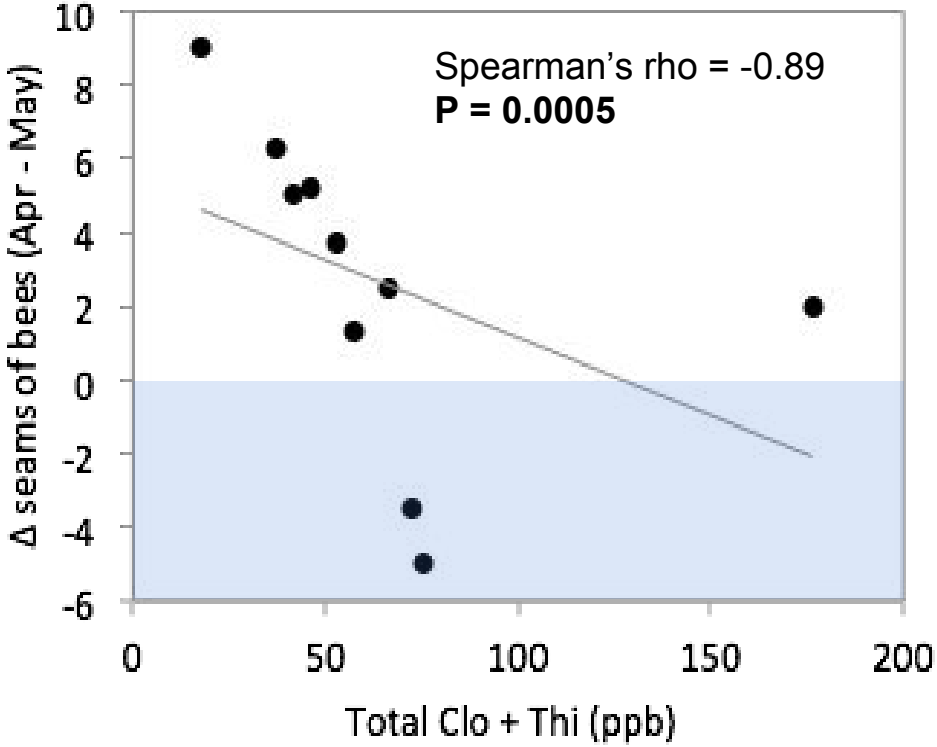
Trends of increasing neonic concentration in pollen with more corn in the surrounding landscape



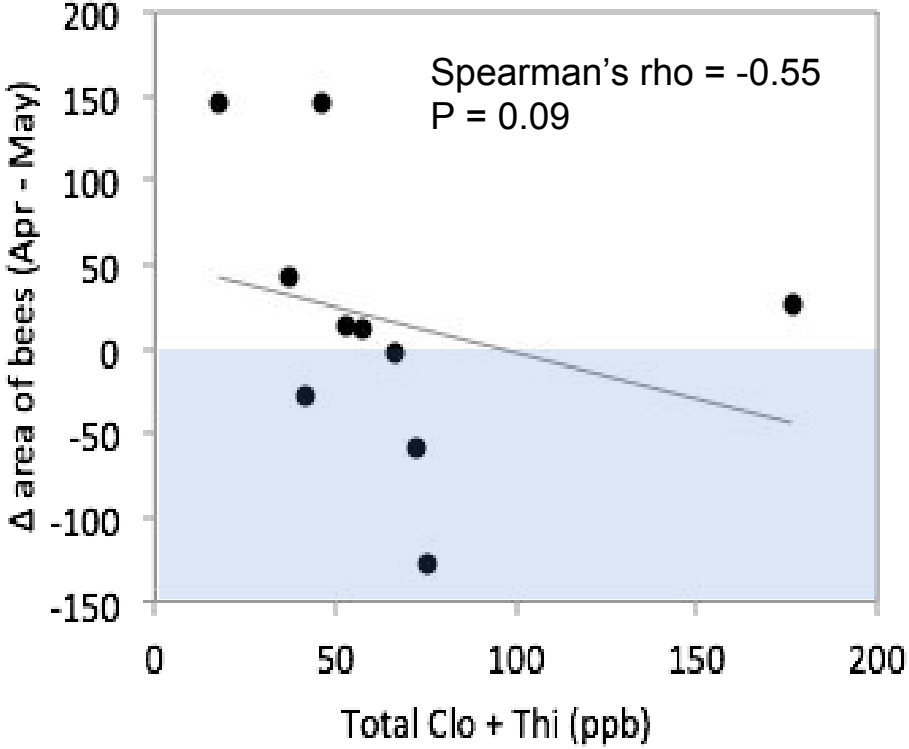


Hive-level effects: worker bees

Seams of bees

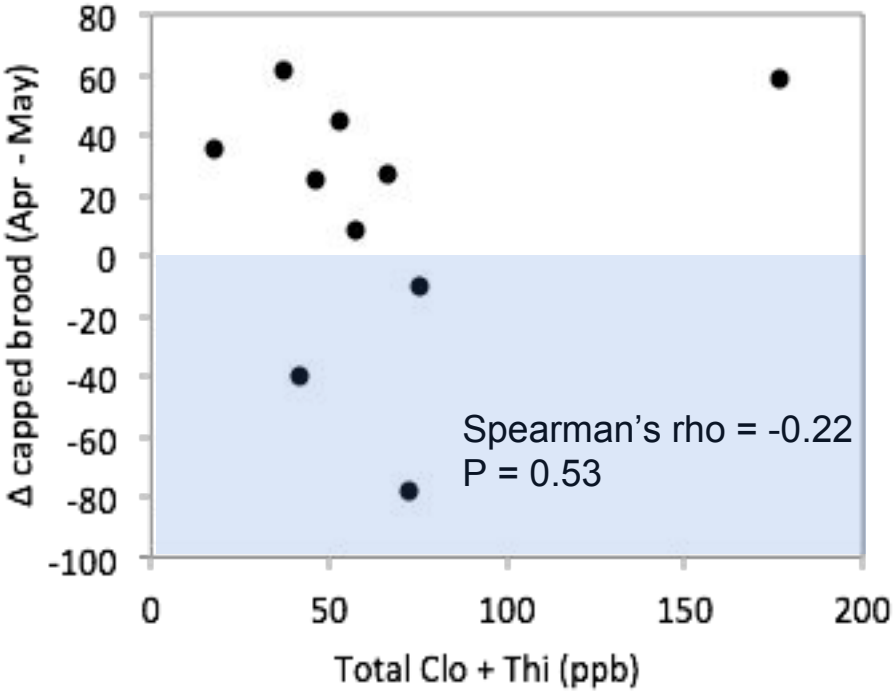


Area of bees

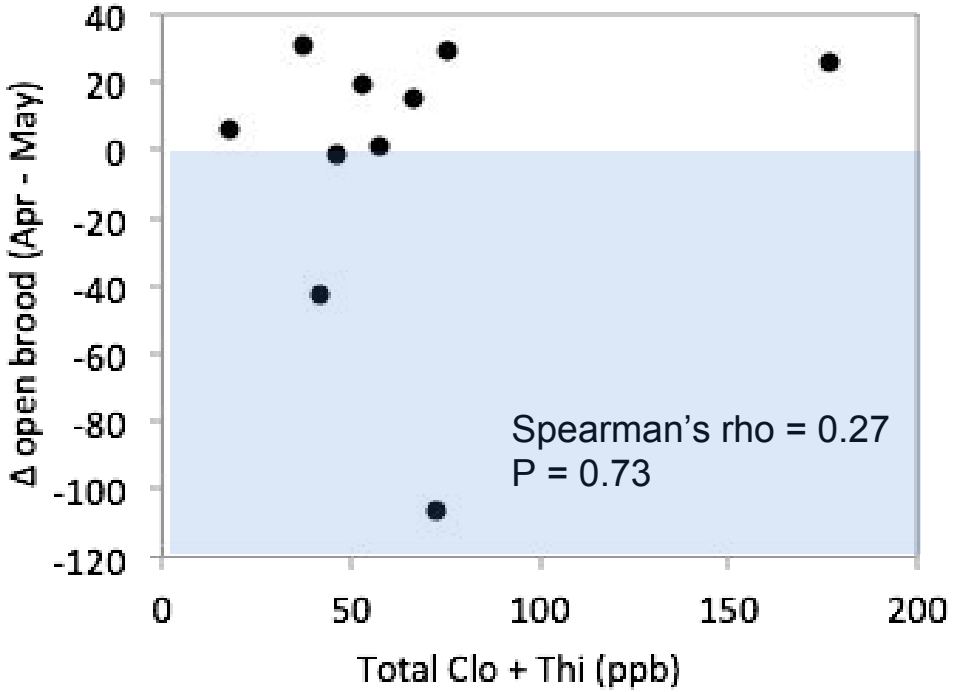


Hive-level effects: brood

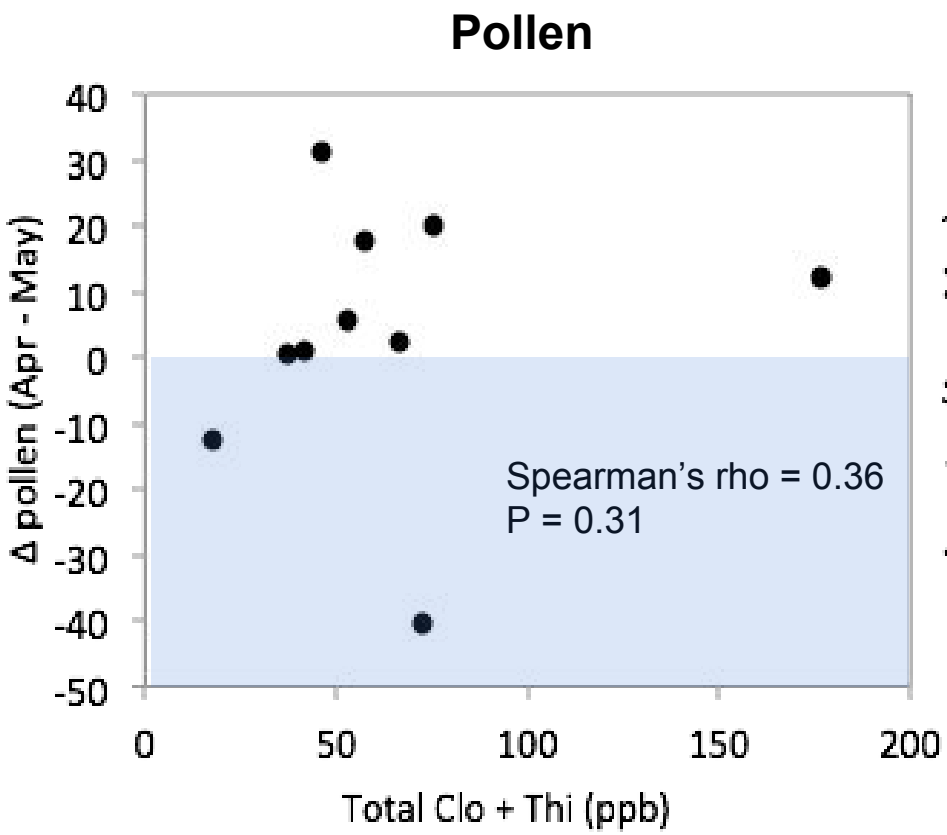
Capped brood

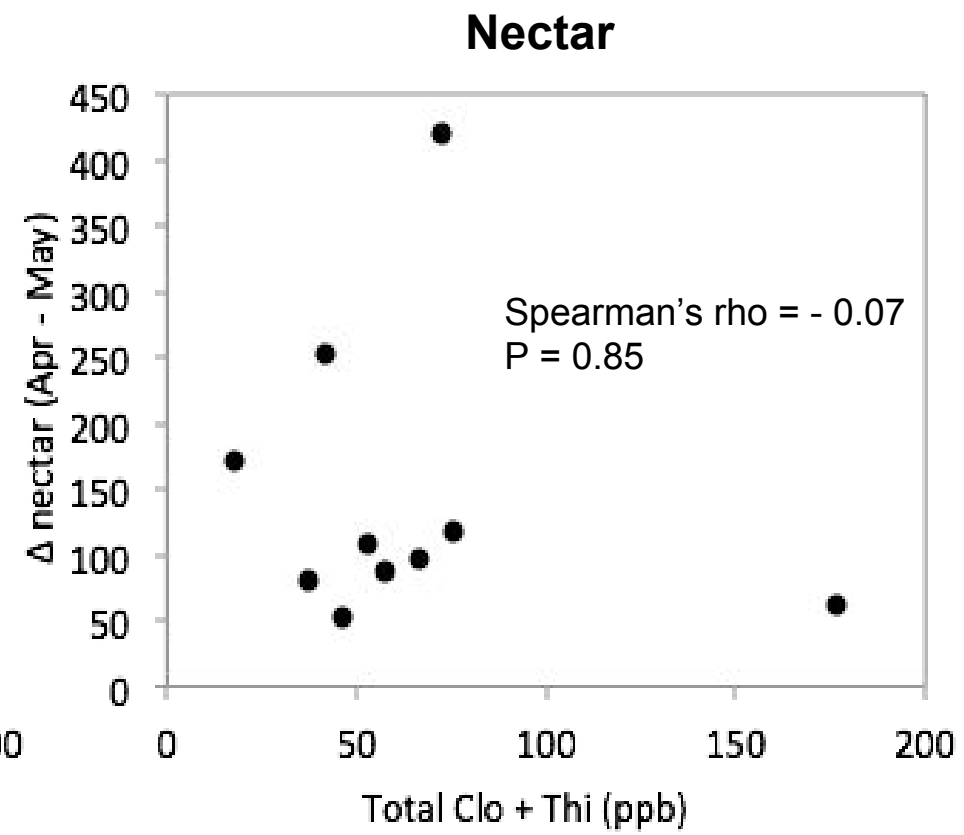


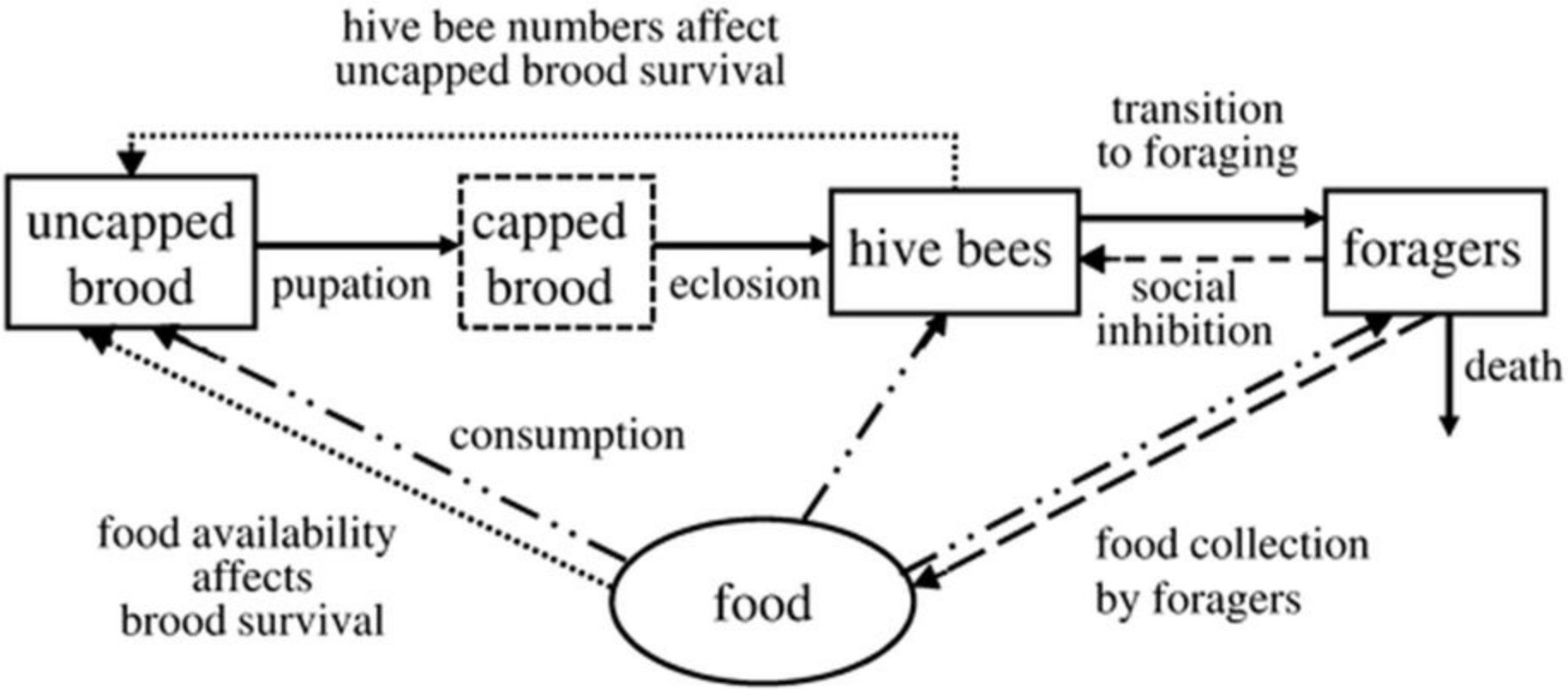
Open brood



Hive-level effects: food storage







Khoury et al., 2013

Closed Nuc Experiments

Bee Brief 4-frame nuc box

Assembled nucs > 4 weeks before experiment:

- 1 frame of honey
- 1 frame of capped brood
- 1 - 2 frames of bees
- ripe queen cells supplied by a local breeder

Three days before experiment:

- Identified 6 healthy nucs with actively laying new queens
- Caged the queen to ensure no egg was present when the trial began

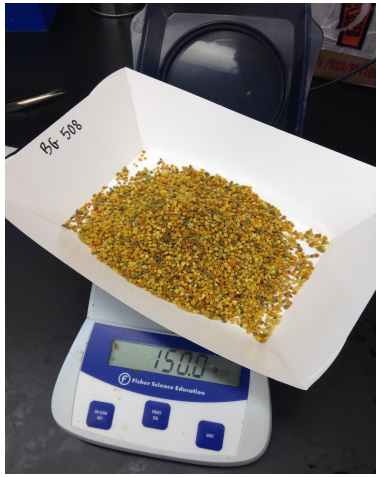
Treatments:
150 g pollen + 20ml 50% sugar syrup

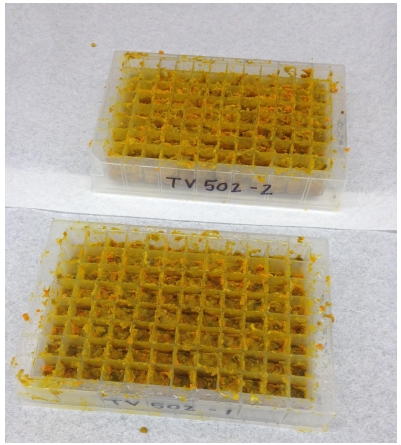
Control: pollen with ~ 0 ppb residue

Low exposure: pollen with 10 - 20 ppb clo. + thi.

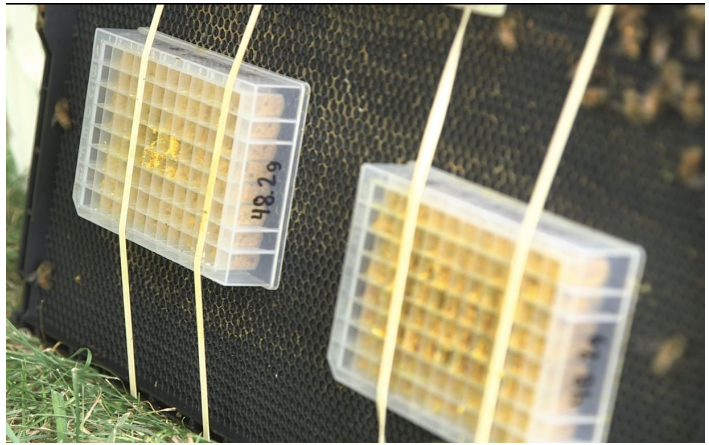
High exposure: pollen with > 20 ppb clo. + thi. (max = 107 ppb)

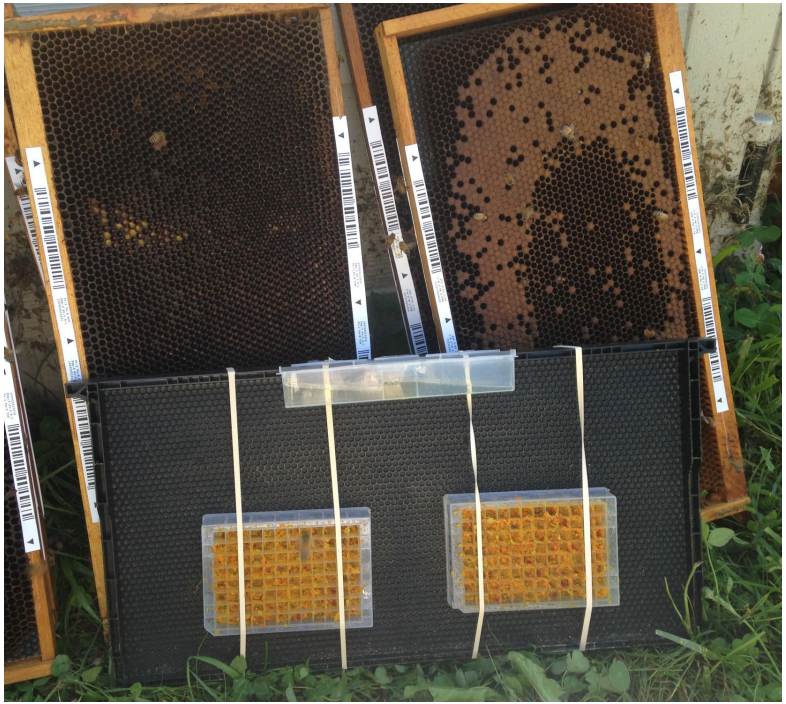
Positive control: pollen with ~ 0 ppb residue, syrup spiked with clothianidin (final concentration = 400 ppb)





Biotrix microplates





Foundation + pollen

Brood

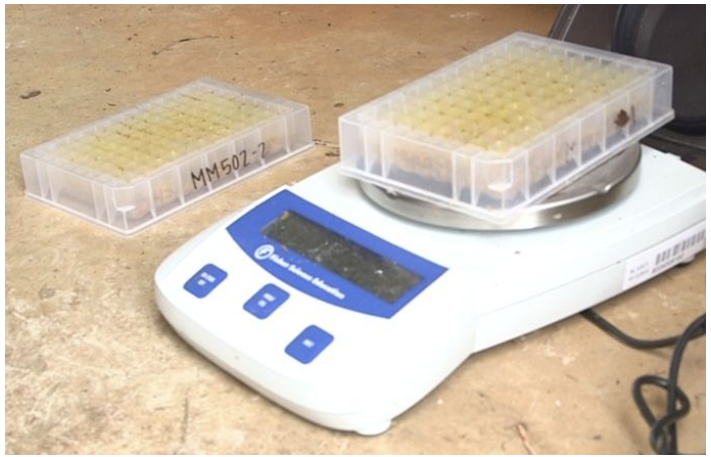
Empty comb

Foundation

Closed nucs were kept indoor during trials (5 trials total)
Opened on days 4, 8, and 12 for sampling and recording data

Sampling:

- pollen
- nurse bees
- mature larvae if available

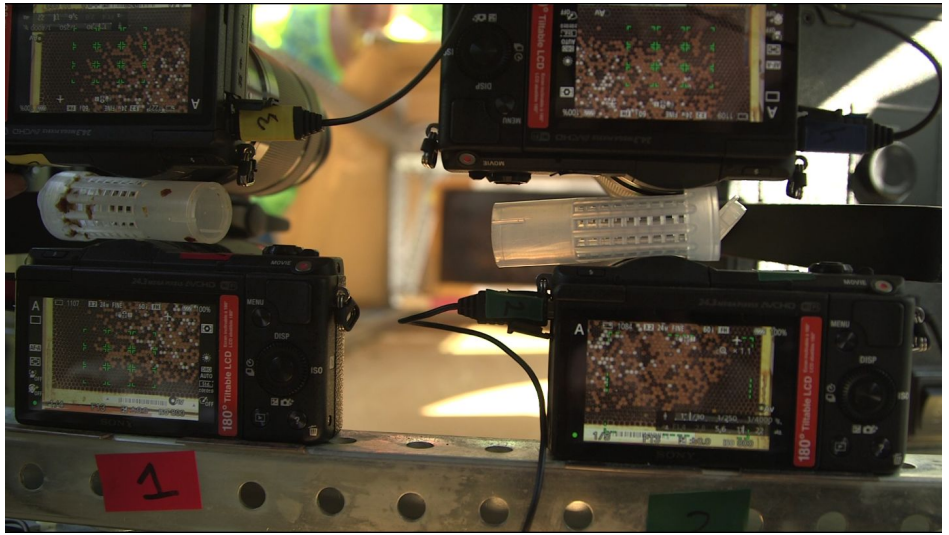


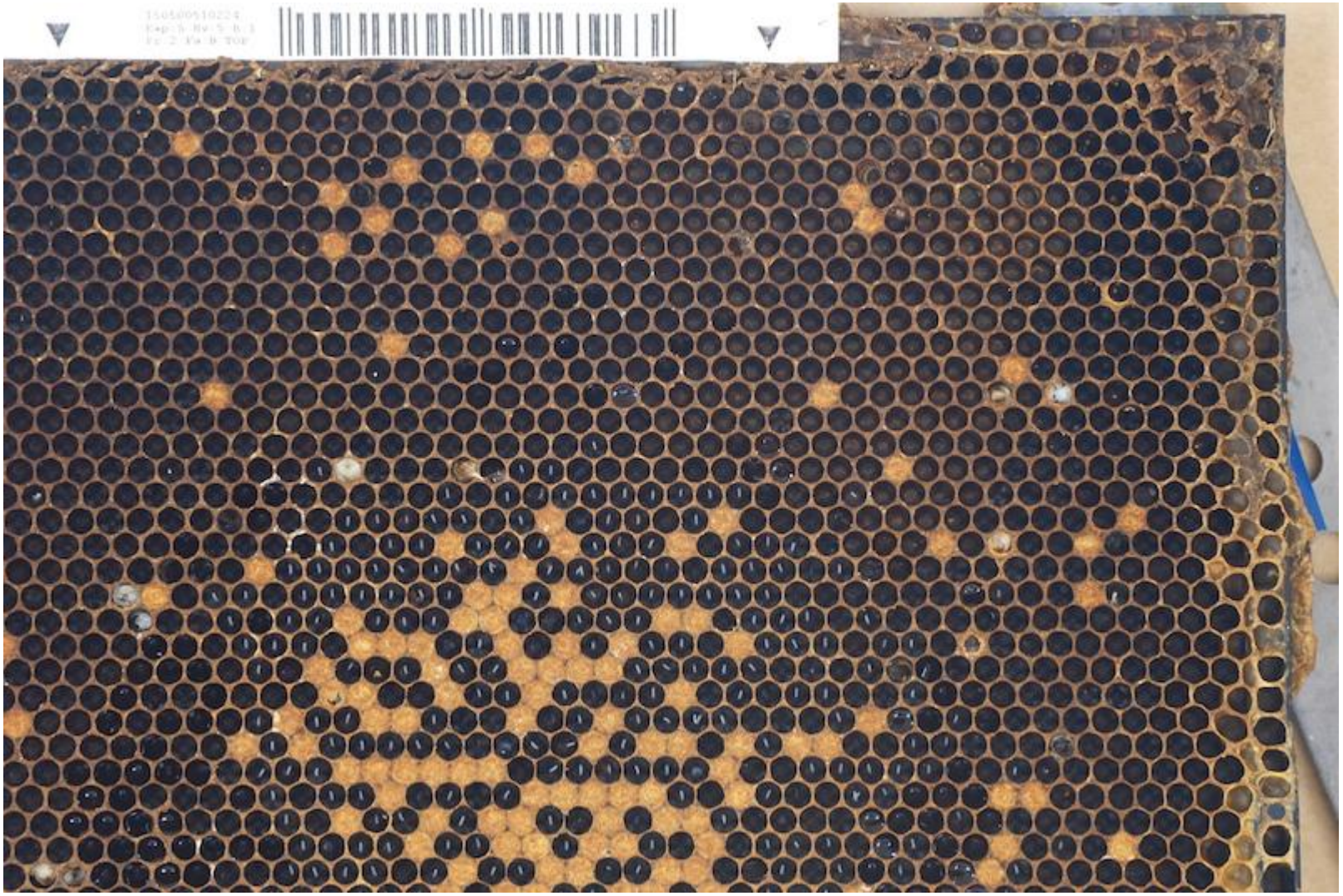
Mobile bee studio

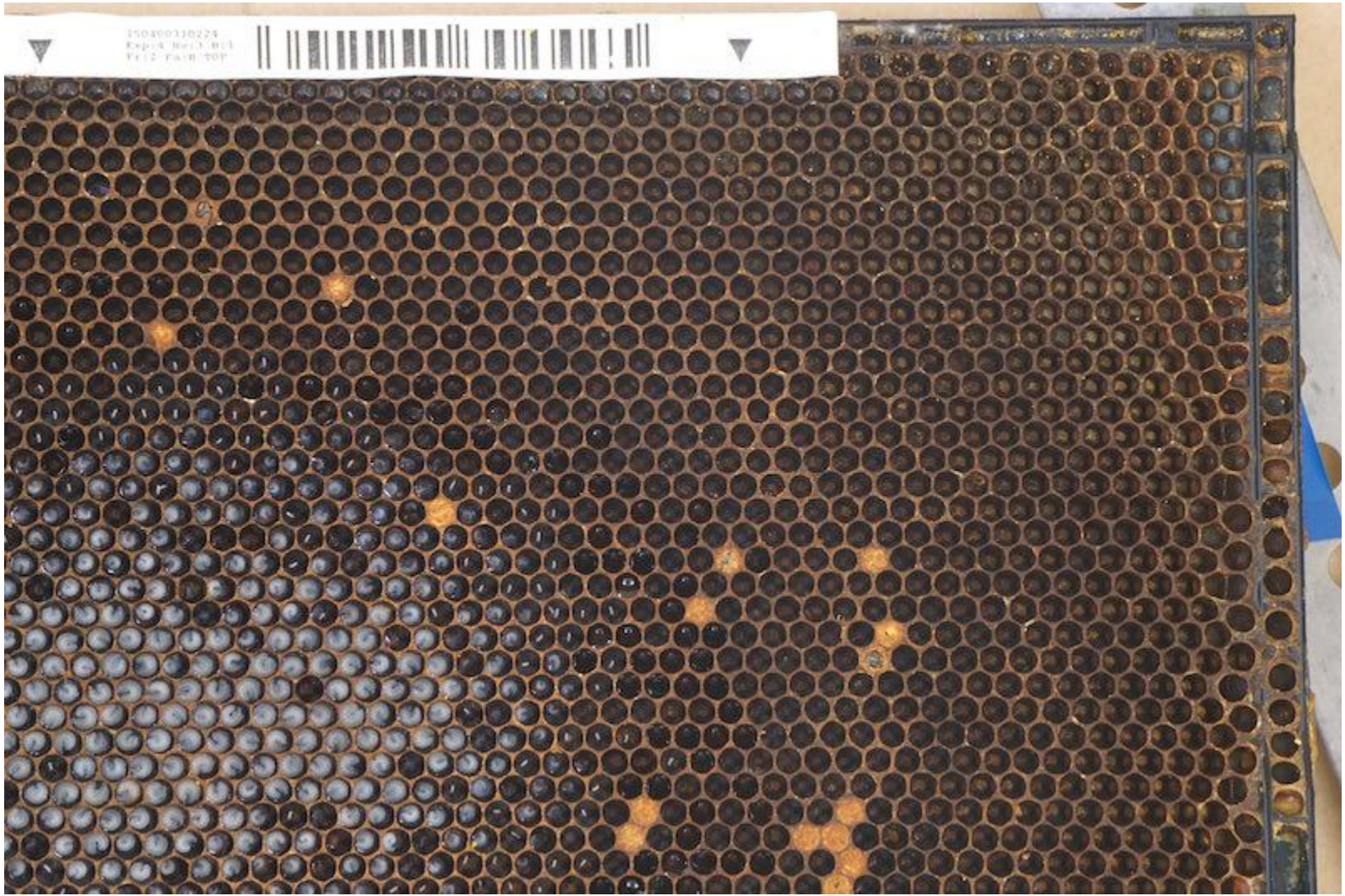
Photographing frame status

- each side of a frame is divided to 4 quarters, each assigned with a unique identifier barcode

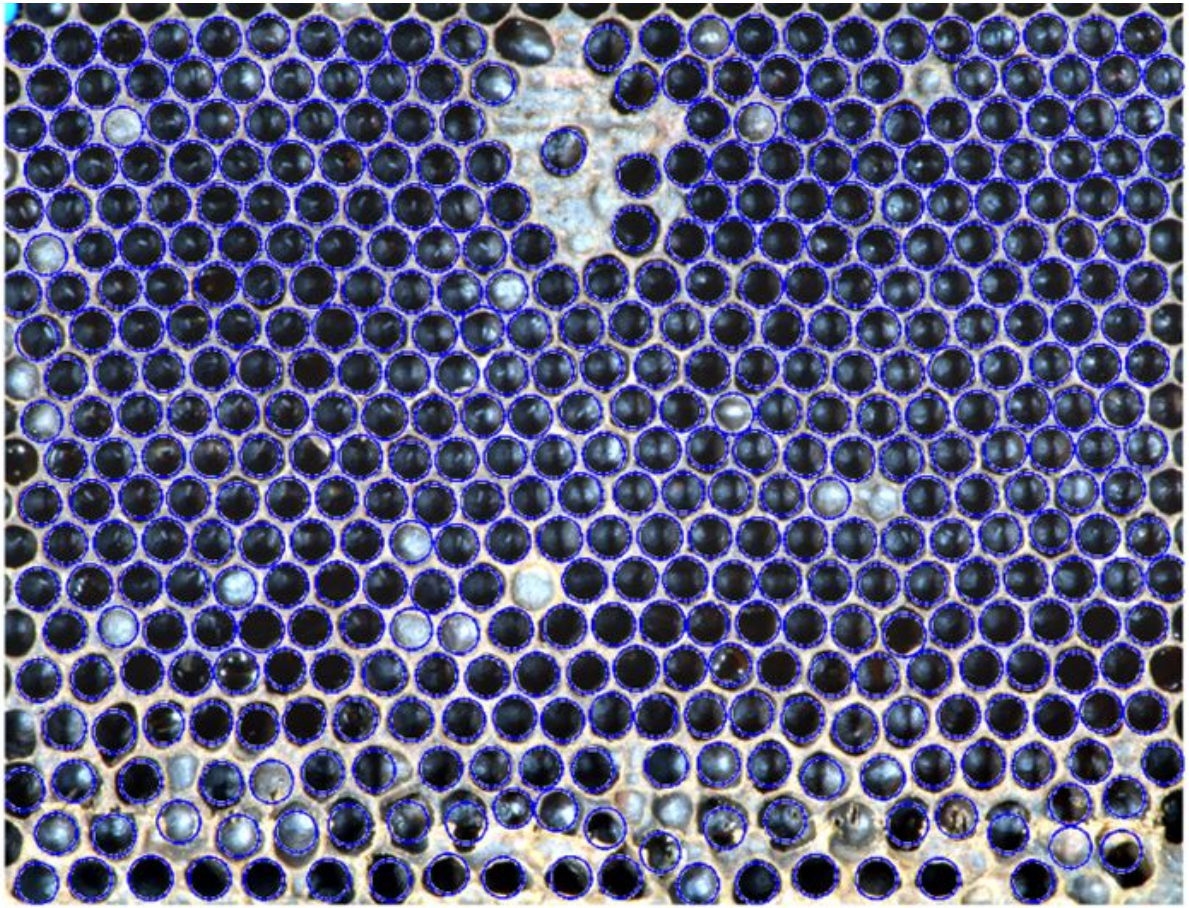
- images of the quarters are re-assembled and frame contents are quantified using computer programs



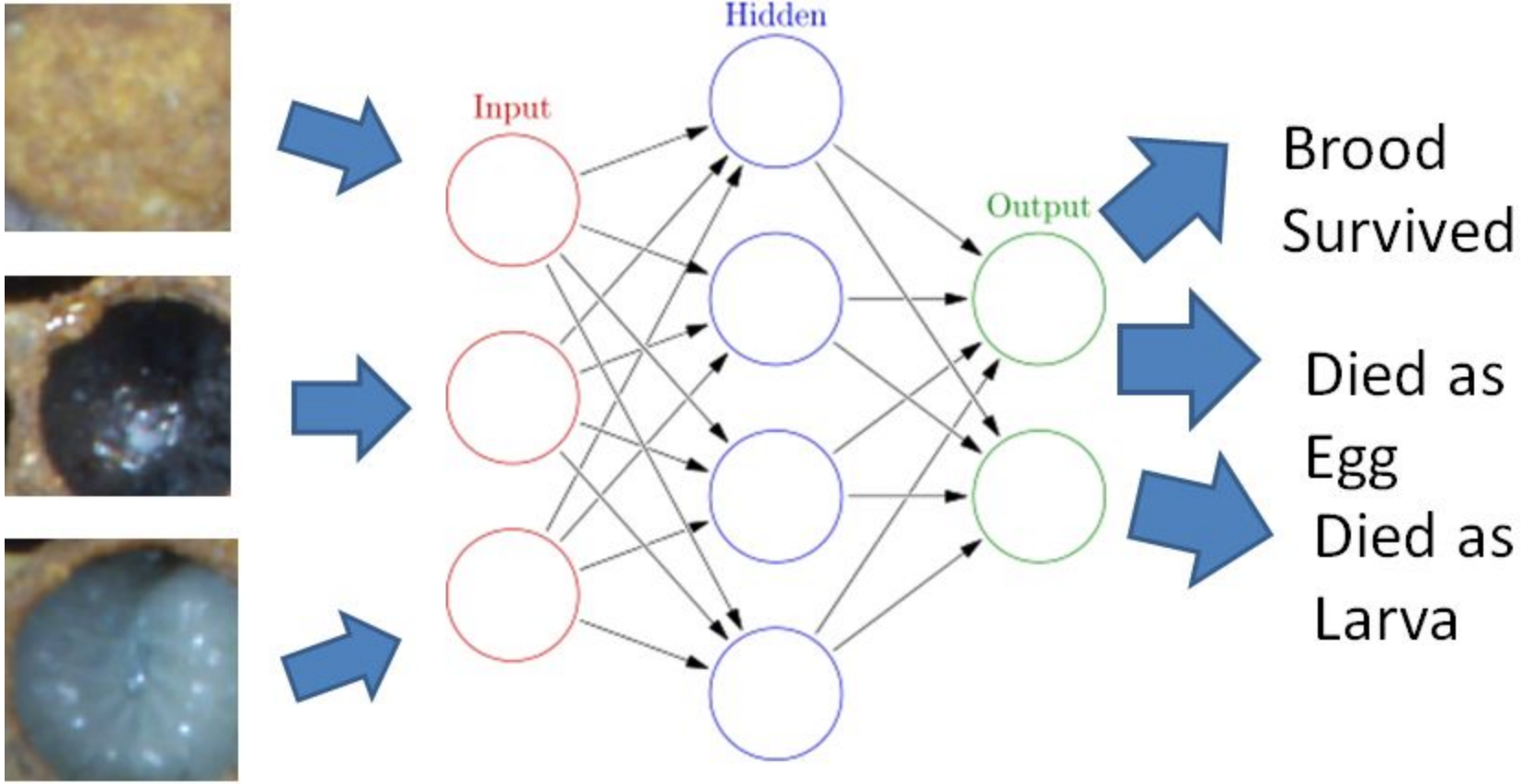




Computer detection of cell location



Automated Cell Scoring Software



Determine fate of each egg laid